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U. S. Department of Agriculture

PEANUT RESEARCH

At The

Southern Utilization Research
and
Development Division
New Orleans, Louisiana

1942 - 1961

Revised by
Marie A. Jones
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This bibliography is a revision of AIC-369, SRRL Publications on Peanuts, 1942-1953, compiled by Kathryn L. Baringer. Papers published since that time have been included. Principal changes in material from the earlier publication are in format.

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RESEARCH AT SU BENEFITS PEANUT INDUSTRY

Peanuts, one of the important cash crops of the South, have been a subject of study at the Southern Utilization Research and Development Division since its beginning in 1940 with the opening of the Southern Regional Research Laboratory. These investigations have resulted in a number of valuable contributions to the advancement of the peanut industry in the past, with developments of even greater significance in prospect for the future.

One of the first projects undertaken at the Southern Laboratory was to improve the quality of peanut oil for use in salad dressings, mayonnaise, and other culinary and table uses, and for some industrial purposes. Preliminary investigations showed that for most purposes the properties of peanut oil required modification, such as hydrogenation; low temperature solvent fractionation, or winterization; molecular distillation; saponification and re-esterification, and inter-esterification.

Researchers demonstrated that peanut oil could be hydrogenated in such a manner that a part of it resembled olive oil in the physical and chemical properties required for its use as a textile lubricant; in fact, industrial users reported it to be superior to the olive oil it was intended to replace. Although this oil was not as well adapted to sulfonation as olive oil, it was found that an excellent oil for sulfonation could be produced by esterifying the acidulated soap stocks from refining peanut oil.

Investigation of possible industrial uses of the protein in the residue of peanuts after extraction of the oil led to several interesting developments. About this time considerable attention was directed toward development of wool-like fibers from casein and other natural proteins, and shortly before the beginning of World War II British researchers developed "Ardil" from peanut protein. Workers at SRRL succeeded in making a fiber from peanut protein which they called "Sarelon." Sarelon is lustrous and creamy-white, with properties of softness and warmth similar to wool. Peanut protein was also used for the preparation of plywood glues, rewettable glues, paper coatings, sizing material for window shades, and various other industrial uses.

During this time a great deal of information was developed on the chemistry and behavior of peanut oil and protein, and on the influence of processing variables on quality. Use of solvents to extract oil was being widely adopted and studies were made to adapt the process to peanuts.

For many years peanut butter has been, and still is, the largest single outlet for peanuts in this country. Recognizing this fact, and the need of processors for accurate information to guide them in their operations, a systematic study of the variables affecting the quality of peanut butter was initiated. These studies resulted in the publication of a series of papers, later collected in a pamphlet which is still in demand as an authoritative treatise on peanut butter manufacture. Effects of time and temperature of roasting on the palatability, appearance, and nutritive properties of the product were determined.

Of great interest from the standpoint of nutritional value was the finding that even light roasting reduces thiamine content greatly, while dark roasting may reduce thiamine content to as low as 3 percent of the original amount. Removal of germs, testa, and other materials from the kernels during roasting and blanching reduced the free fatty acids in the peanut butter, and in the course of the investigation an improved method for removal of the testa was developed. In studying keeping quality, researchers investigated the tocopherols (natural antioxidants) present in peanuts, and their relation to keeping quality. Equipment for the continuous enrichment of peanut butter with vitamin A was developed. Objective methods for determination of color were developed. Peanut butter manufacturers relied on the addition of hydrogenated peanut oil to the butter to prevent oil separation; investigation brought out specific information to be used as a guide in this operation.

Since the quality of any product depends to a great extent on the quality of the raw material, composition and properties of the raw kernels and of oil and meal were investigated. A method for determination of moisture was developed to provide the basis for the official method, and also for trading rules on peanuts.

These are some of the earlier contributions by the Southern Division to the improvement of the peanut industry. With solution of some of the more obvious problems, emphasis of the research effort has changed, but the program interest is in some ways even greater. Representatives of the peanut industry continue to urge research on the composition of the peanut, with a view to improving the flavor of processed products. One of the major accomplishments in this area to date has been isolation and identification of the bitter principles of the peanuts as sapogenins.

A surprise development in the utilization of peanuts is their use for the alleviation of hemophilia symptoms. Preliminary reports indicate strongly that peanuts are very effective for this purpose. Chemists in the Southern Division laboratories are studying the isolation of the biologically active agent, a white, crystalline substance believed to the component responsible.

Recently there has been a revival of interest in the possibilities of defatted peanuts - peanuts from which the greater part of the oil has been solvent-extracted. Developmental work is now in progress on a pilot-plant scale on this product.

Peanuts have been found especially suitable for the fundamental research on seed proteins now in progress in the Seed Protein Pioneering Research Laboratory. Investigators have found that the major proteins of the peanut, about 75% of the total protein, are contained in subcellular particles. Other materials are found in sharply localized concentrations within the cell. Sucrose and nucleic acids are found away from the particles; magnesium and potassium are accumulated within particles, whereas calcium is accumulated in the cell walls. Information on the nature and location of proteins in the peanut must be taken into consideration for the development of techniques to make these proteins most available for nutritive purposes. Moreover, the processing of peanuts, in general, must take into account the mixing of sub-cellular constituents during grinding and heating, and the effects of this mixing on the quality of the products.

Seed proteins have assumed greater importance than ever before, with the initiation of organized efforts to overcome an age-old nutritional problem - a shortage of protein in the diet over many sections of the world - a problem which is becoming more acute daily. A development of considerable significance in this connection is a new and more accurate method for measuring the nutritive value of protein in peanuts, through determination of the epsilon-amino groups of lysine, which closely approximates the results of time-consuming and expensive biological tests.

Because of the growing need for protein to meet the world's increased requirements, peanuts, an excellent source of protein of recognized edibility, may well be entering a new era in the nutritional picture. In any event, recent developments indicate that exploration of their potential is still in its early stages, and the future may well present some opportunities not yet anticipated.

2244. INTRACELLULAR DISTRIBUTION OF SEED PROTEINS
Altschul, A. M.; Snowden, J. E., Jr.; Manchon, D. D., Jr.; and Dechary, J. M.
Arch. Biochem. Biophys. 92, 402-04. (1961)

The total proteins from peanuts (Arachis hypogaea L.) were separated into soluble and particle-bound fractions using sucrose and Carbowax as the media; some fractionation of the particle-bound proteins also seems possible by selective disruption of particles. The method of isolation is described. The fractions were examined by chromatography on DEAE cellulose; the total proteins were divided into four groups. The proteins of groups I and II were relatively unchanged in early germination and are water-soluble; those of groups III and IV were globulins, represent 75% of the protein, are the most tightly bound to the adsorbent, show profound changes in early germination, and are particle-bound.

2147. α-CONARACHIN
Dechary, J. M.; Talluto, K. F.; Evans, W. J.; Carney, W. B.; and Altschul, A. M.
Nature 190, 1125-26. (1961)

Chromatography on DEAE cellulose permitted better identification of changes on germination of specific protein fractions of the peanut (Arachis hypogaea). One fraction that changes early on germination was isolated and named α-conarachin. This fraction approaches monodispersity by standards of chromatography and ultracentrifugation. The chromatographic method used is described and patterns given for four arbitrarily-selected protein fractions; arachin (group IV), and conarachin (groups I, II and III).

2192. PRESENT STATUS OF PROTEINS FROM OILSEEDS
Altschul, A. M.
Proc. Intern. Conf. Natl. Acad. Sci. - Natl. Research Council Publ. 843, 517-30. (1961)

Principles and practices involved in obtaining plant protein mixtures of high nutritive value are discussed. Subjects covered are the quantity of oilseeds potentially available for incorporation into mixtures suitable for human foods; problems to be solved in order that these materials can be used effectively in human diets; opportunities already existing for incorporating these materials into high-protein diets; and what can be expected as knowledge and technology advance.

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*Papers abstracted on this page are the most recent publications, and are included as an addendum so as to carry this listing as far forward as possible.

1918. A PEANUT FACTOR FOR HAEMOSTASIS IN HAEMOPHILIA
Boudreaux, H. B.; and Frampton, V. L.
Nature 185, 469-70 (1960)

Oral ingestion of peanut flour or an alcohol extract of defatted peanut meal equalling one to two pounds of peanuts per day was observed to relieve haemophiliacs from pain and swelling indicative of active haematomata in haemophilia.

1933. SUBCELLULAR DISTRIBUTION OF SUBSTANCES IN SEEDS OF Arachis hypogaea
Dieckert, J. W.; and Snowden, J. E., Jr.
Federation Proc. 19, 126 (1960) (Abstract) (Reprints not available)

The quiescent state in seeds is not well understood. One facet of the problem is the biochemical cytology of late maturation, quiescent and early germination stages of the seed. To learn more about this aspect of the problem, a study was made of the intracellular distribution of substances in the cotyledons of peanuts. Several subcellular components were isolated by homogenization and differential centrifugation in nonaqueous media. The most homogeneous fractions were: aleurone grains, protein bodies, starch grains, cell walls and a reticulum. Nuclei were not obtained pure. Analysis indicated that the aleurone grains are high in protein, phytin and ash. The protein bodies are high in protein and low in phytin. Starch grains are low in protein and phytin but high in starch. DNA followed nuclei only. The reticulum is high in protein, phosphatides and RNA. The presence of RNA here suggests the presence of important enzyme-forming elements that will become functional during germination. The cell wall fraction showed more nitrogen than expected on the basis of observed contamination by high protein particulates. This suggests that non-particulate cytoplasmic material remains with the cell wall. These data confirm that a high degree of compartmentation exists in the quiscent cell.

1997. BIOASSAY OF A HEMOSTATIC FACTOR FROM PEANUTS
Boudreaux, H. B.; Boudreaux, R. M.; Brandon, M.; Frampton, V. L.; and Lee, L. S.
Arch. Biochem. Biophys 89, 276-80 (1960)

Extreme vasoconstriction is induced on the transection of arteries of the cheek pouch of bilaterally adrenalectomized male hamsters that have ingested an absolute alcohol extract of defatted peanuts. This is compared with slight or moderate vasoconstriction observed with control bilaterally adrenalectomized male hamsters. Apparently the

vasoconstrictor from peanuts is released from storage in the blood platelets during their viscous metamorphosis in the formation of the platelet plug. The active factor is also myotonic to smooth muscles.

1779. SAPONINS OF THE PEANUT: ISOLATION OF SOME PEANUT SAPOGENINS AND THEIR COMPARISON WITH THE SOYA SAPOGENOLS BY GLASS-PAPER CHROMATOGRAPHY
Dieckert, J. W.; Morris, N. J.; and Mason, A. F.
Arch. Biochem. Biophys. 82, 220-28 (1959)

A column is described that directly scales up glass-paper chromatography. The new column was used to obtain milligram quantities of peanut sapogenins A_1, A_2, C_1, and C_2. The silicic acid, potassium silicate, and the monopotassium phosphate forms of glass paper have been used to compare four peanut sapogenins with the four soya sopogenols A, B, C, and D. The soya sapogenols were resolved on glass paper impregnated with silicic acid. Soya sapogenol B and D could not be separated on glass paper treated with potassium silicate or on glass paper treated with monopotassium phosphate. Peanut sapogenins A_2, C_1, and C_2 are distinct from soya sapogenois A, B, C, and D. Peanut sapogenin A_1 chromatographs like soya sapogenol B on all three forms of glass paper.

1768. HIGHLIGHTS OF PEANUT UTILIZATION RESEARCH AT SURDD
Fisher, C. H.
Peanut J. and Nut World 38, (6); 14, 16, 31-33 (1959)

Research in the Southern Division applicable to peanuts is summarized. This includes research projects directed specifically to the study of peanuts, and also research of a more general nature on oilseeds and vegetable oils. In the first group are investigations of the constituents which cause peanuts to have a bitter flavor, and the effects of curing and processing on peanut constituents, especially with regard to flavor, aroma, and nutritive value. Among the more general research developments which might offer outlets for peanut oil are a domestic fat with properties similar to those of cocoa butter, for use in the confectionery industry; acetoglycerides and polymeric fats, compounds with special properties which can be 'tailored' for specific uses, such as coatings, global spreads, and other uses where unusual properties are desirable.

1681. HEAT EFFECTS ON PEANUT PROTEINS. EFFECT OF PROCESSING ON THE epsilon-AMINO GROUPS OF LYSINE IN PEANUT PROTEINS
Bensabat, L.; Frampton, V. L.; Allen, L. E.; and Hill, R. A.
J. Agr. Food Chem. 6: 773. 1958

Peanut flour can be analyzed for protein deterioration by following the change in the ε-amino groups of lysine, which was determined colorimetrically as the ε-2, 4-dinitrofluorobenzene derivative.

1679. BITTER PRINCIPLES OF THE PEANUT, ISOLATION, GENERAL PROPERTIES, AND DISTRIBUTION IN THE SEED
Dieckert, J. W.; and Morris, N. J.
J. Agr. Food Chem. 6: 930. 1958

A concentrate of the bitter principles of peanut hearts has been prepared, which posesses the general properties of the saponins. Glass paper chromatography indicates at least four components, each stained reddish purple with concentrated sulfuric acid and altered by acid hydrolysis. Aglycones obtained by acid hydrolysis can be separated into at least six components by chromatography on glass paper treated with monopotassium phosphate. Each gives a reddish purple color with sulfuric acid. The sugar moiety from the hydrolytic cleavage products gives four spots when chromatographed. These spots correspond in Rf value and color to glucose, xylose, rhamnose, and glucuronolactone.

1465. DE-OILING OF PEANUTS TO YIELD A POTENTIALLY USEFUL FOOD PRODUCT
Willich, R. K.; and Feuge, R. O.
Food Tech. 11: 332-36. (1957)

Experiments have shown that oil can be removed from whole peanuts, either raw or roasted, by soaking them in a suitable solvent. The moisture content of the peanuts and the nature of the solvent are among the factors which influence the extraction rate. With commercial hexane at 30° C. about 50% of the oil can be removed in about 50 hours from blanched peanuts having a moisture content of 3%. It is expected that a large-scale extraction would be carried out in storage tanks and the solvent would be changed infrequently. Residual solvent can be removed from the de-oiled peanuts by warming and stripping with air under reduced pressure. The de-oiled peanuts still retain part of their characteristic flavor, though a large part of the flavor is lost. Retaining a portion of the oil in the peanuts improves their flavor. The texture of the de-oiled peanuts is firm, and the crispness appears to be unchanged.

1466. PURPOSE OF CONFERENCE. An Address at a Peanut Research Conference in Atlanta, Ga., February 21-23, 1957
Altschul, A. M.
Proc. Peanut Research Conference 1957, 5-8

Four general objectives of the research conference are stated. The production of peanuts in the United States for 1956 was 783,000 tons, valued to the farmers at $189 million. While in most parts of the world peanuts are important as a source of oil and meal, in this country only 23% are crushed for oil and meal, the remainder are eaten as nuts, or in peanut butter. New uses might be developed to broaden the market; studies on the composition of peanuts, especially in regard to trace materials and nutrients, could be of value in determining food value. Another field of exploration, that of fats in the diet is of great interest to the peanut industry.

1538. A PHYSICOCHEMICAL STUDY OF PEANUT PROTEIN IN UREA SOLUTIONS
Evans, W. J.
Arch. Biochem. Biophys. 72: 226-33. (1957)

Sedimentation and other physicochemical measurements were carried out on peanut protein dissolved in aqueous urea solutions. In 1-3M urea solutions three sedimenting species were observed; in 4-6M, two; in 7M urea, only one sedimenting species. Further studies indicate a molecular weight of about 21,000 for the protein in 7M urea solutions. It appears that this molecular species may be the "basic unit" of peanut storage globulin.

1236. MEAL RECYCLING METHOD OF SOLVENT-EXTRACTING OILSEEDS OF HIGH FAT CONTENT: APPLICATION TO FILTRATION-EXTRACTION OF PEANUTS.
Pominski, J.; Vix, H. L. E.; and Pollard, E. F.
J. Am. Oil Chemists' Soc. 32: 565-67. (1955)

A modification of the solvent extraction method for oilseeds of high fat content is described. Portions of materials which have been solvent-extracted and completely desolventized by drying are added back to the unextracted raw flakes. The extraction rate is substantially increased, and the quantity of fines substantially reduced. Prepressing, cooking, resizing and reforming prior to extraction are eliminated. When the method was applied to raw peanut flakes, the mass velocity was increased from 112 to 2850 pounds per hour, yielding an extracted meal containing less than 1% residual lipids. The method, while applied to filtration-extraction of peanuts in the laboratory, should be applicable to any type

oilseed, and any type of solvent extraction and make possible a solvent extraction of oilseed previously considered unsuitable for processing by this method.

1152. NEW INFORMATION ABOUT AN OLD CROP -- PEANUTS
Baringer, K. L.
Gard. J. New York Bot. Soc. 5(1): 6-9. (1955)

More than a decade of intensive research on the chemistry and technology of the peanut is reviewed. Following a brief discussion of the botanical and cultural background of peanuts, structure and constituents are discussed. Research at the Southern Utilization Research Branch has covered moisture content, effect of storage conditions, and heat properties. Studies on methods to improve stability of peanut oil have resulted in isolation and investigation of tocopherols of peanuts. Heat properties of peanut oil, and methods of improving quality of peanut butter have been studied; a substitute for olive oil as a lubricant in the textile industry, a new fiber from peanut protein, and a solvent extraction process for extraction of peanut oil have been developed.

1154. FILTRATION-EXTRACTION OF PEANUTS ON A BENCH SCALE
Pominski, J.; Knoepfler, N. B.; Graci, A. V., Jr.; Molaison, L. J.; Kulkarni, B. S.; and Vix, H. L. E.
J. Am. Oil Chemists' Soc. 32: 361-64. (1955)

Filtration-extraction has been successfully applied to peanuts on a bench scale. The results indicate that there should be little difficulty in adapting this process on a pilot plant or commercial scale. Data show that the optimum conditions for preparing peanut flakes of approximately 0.010 inches thickness for filtration-extraction are: preheating to approximately 170° F., moisture addition of 10-12.5%, cooking and drying at 190° to 220° F., crisping, rerolling through rolls set at 0.003 inches, and ending with a final moisture of about 7%. In the filtration-extraction of the prepared peanut flakes, a slurrying time of 30 minutes and a solvent-to-meal ratio of 1.5 to 1.0 are adequate. Mass velocities of 2800 to 4800 lbs./sq.ft./hr. are obtained and residual lipids in the extracted meal are approximately 1%. These mass velocities are suitable for commercial use. The extracted meals have a protein solubility of about 80%.

1103. PEANUT BUTTER. VI. THE EFFECT OF ROASTING ON THE PALATABILITY OF PEANUT BUTTER
Morris, N. J., and Freeman, A. F.
Food Tech. 8: 377-80. (1954)

Peanut butters prepared in the pilot plant from peanuts roasted to various extents were evaluated periodically to determine the effect of extent of roasting accorded the peanuts on flavor characteristics during two years' storage. Taste panel data show that in the opinion of the panel peanut butters from medium roasted peanuts exhibited the most desirable flavor and good flavor retention.

1106. CONTINUOUS ENRICHMENT OF PEANUT BUTTER WITH VITAMIN A.
Willich, R. K., and Freeman, A. F.
Food Eng. 26(8): 129, 131, 166. (1954)

Equipment for the continuous delivery of materials required in the manufacture of peanut butter fortified with vitamin A has been described. Results of measurements with this equipment of the rates of delivery of roasted peanuts, hydrogenated peanut oil, salt, and peanut oil to serve as a carrier for vitamin A indicated a high degree in uniformity of delivery. No significant changes in rate of delivery were found upon reduction of the "head" or supply of material contained in the hoppers.

1107. PEANUT BUTTER. VIII. EFFECTS OF PROCESSING AND STORAGE ON VITAMIN A INCORPORATED IN PEANUT BUTTER
Willich, R. K., Morris, N. J., O'Connor, R. T., and Freeman, A. F.
Food Tech. 8: 381-84. (1954)

The effects of processing temperatures and conditions of storage on the vitamin A palmitate incorporated in peanut butter have been investigated. While no significant losses could be attributed to temperature only, a definite but small loss in vitamin A may be attributed to the inclusion of atmospheric oxygen, and to frictional heat produced in the manufacture of the product. The content of vitamin A incorporated in peanut butter remained satisfactorily high, although reduced, after storage of the product for 6 minths at either 80° or 100° F.

1019. PEANUT BUTTER

Freeman, A. F.; Morris, N. J.; and Willich, R. K.
U. S. Dept. Agr. Bur. Agr. Ind.Chem. AIC-370. 61 pages. Processed. (1954).

Sixteen scientific papers by members of SURB pertinent to the manufacture of peanut butter are reviewed, plus 82 publications by other investigators. Effects of roasting and other processing operations and effects of storage on the development of rancidity, thiamin content, and extent of oil separation were studied through production of butters on pilot-plant equipment, followed by chemical analyses and taste panel tests. Some methods for evaluating peanut butter and constituents were modified to give a better measurement; for instance, reflectance spectrophotometry was established as an objective measurement of the color of peanut butter. The nature of the stabilizing effect of hydrogenated peanut oil in peanut butter and composition of peanuts from different varieties as related to the stability of the derived oils were studied. Processes for the incorporation of vitamin A in peanut butter were evaluated; and an improved, continuous process was developed.

1038. PROCESS FOR THE PRODUCTION OF SUESTANTIALLY SKIN-FREE PEANUT KERNELS

D'Aquin, E. L.; Pominski, J.; Molaison, L. J.; and Vix, H. L. E.
U. S. Patent No. 2,687,155. August 24, 1954

This is a method of blanching peanuts so that substantially all of the skins are removed, to produce a color-free source of peanut protein. Peanuts are immersed in water until they absorb a specified amount, the moist peanuts are dried at a moderate temperature until they have a specified moisture content, and the peanuts so treated are blanched in the usual manner.

1109. UTILIZATION RESEARCH ON PEANUTS

Altschul, A. M.
Peanut J. and Nut World. 33(9): 11, 12, 39. (1954)

There is a surplus of peanuts in the United States -- about 62 million pounds in 1954. Utilization research is the most promising approach towards meeting this problem. The status of research on peanuts at this Laboratory is reviewed. It is mentioned that 92 publications have been issued on this research. A conference held at this Laboratory attended by representatives of the industry and researchers of various agencies indicated that research would be done to improve the quality of peanuts.

1023. SOLUBILITY OF HYDROGENATED PEANUT OIL IN PEANUT OIL

Magne, F. C.; Skau, E. L.; and Freeman, A. F.
J. Am. Oil Chemists' Soc. 31: 113-14. (1954)

The principal process used to prevent the separation of peanut butter into an oil phase and a meal phase involves the uniform incorporation of small amounts of hydrogenated peanut oil. Solubility measurements have been made for a commercial hard peanut fat in a refined and bleached peanut oil. The nature as well as amount of solid crystals present in the oil is important; under controlled conditions any amount of the high-melting modification of the hard fat incorporated in peanut oil above the solubility temperature in excess of 2% should produce a mixture free from oil separation under average storage conditions.

1016. PHASE RELATIONS PERTAINING TO THE SOLVENT WINTERIZATION OF CRUDE PEANUT OIL IN 85-15 ACETONE-HEXANE MIXTURE

Boucher, R. E., and Skau, E. L.
J. Am. Oil Chemists' Soc. 31: 268-70. (1954)

A process for winterizing crude peanut oil can be visualized which would involve mixing the proper proportions of the concentrated crude hexane miscella and acetone to make up a winterizable mixture of 35% by weight of oil in an 85-15 acetone-hexane mixture. Performing the winterization step before refining, bleaching, and deodorizing would result in a fully winterized salad oil and eliminate readdition of solvent and restripping. For more satisfactory crystals lower oil-solvent ratios at lower temperatures are required than for refined peanut oil. From a practical point of view, the winterization can best be carried out on a 35% oil solution in the acetone-hexane mixture at -12° C. with a 1-hour holding time.

1029. PEANUT PROTEIN: ISOLATION, COMPOSITION, AND PROPERTIES.

Arthur, J. C., Jr.
Advances in Protein Chemistry, Ed. by M. L. Anson, K. Bailey, and J. T. Edsall. Vol. VIII. Pages 393-414. 1953. Academic Press, Inc., New York, N. Y. (1953)

This review cites 240 references from the world literature. Protein content of the nut or kernel is about 25%, which makes the peanut a significant source of vegetable protein for foods, feeds, and industrial products. Peanut protein consists of two principal fractions, arachin and conarachin. Very little information is available

on chemical reactions of peanut protein. Nutritional value of peanut protein compares favorably with other vegetable proteins; but compared with animal proteins, is deficient in lysine and methionine. Fibers, glues, sizings, and other industrial products have been made experimentally from peanut protein.

966. ELEVATION OF THE INTRINSIC VISCOSITY OF PEANUT PROTEIN BY TREATMENT WITH TEREPHTHALYL DICHLORIDE
Mann, G. E.
J. Am. Chem. Soc. 75: 35-26-29. (1953)

Treatment of aqueous alkaline dispersions of peanut protein with the bifunctional acid chloride, terephthalyl dichloride ($pC_6H_4(COCl)_2$), results in modified proteins of elevated intrinsic viscosity as measured at 25.0°, using 10 M urea as the solvent. It also results in depression of the solubility of the protein in this solvent.

957. DETERMINATION OF MOISTURE IN PEANUT BUTTER
Pepper, M. B., Jr., and Freeman, A. F.
J. Am. Oil Chemists' Soc. 30: 335-37. (1953)

The moisture and volatile contents of whole peanuts were determined by A.O.C.S. Official Method (Ab 2-49) and compared with the moisture content of the sliced peanuts determined by a toluene distillation procedure described by Tyron (J. Research Natl. Bur. Standards 45 (5): 362-366. 1950). Moisture was determined by an oven loss-in-weight technique corresponding to conditions of A.O.C.S. Official Method (Ab 3-49) for "Second" moisture, and by the toluene distillation method. Tyron's apparatus seems to make the toluene distillation procedure particularly adaptable to peanut butter.

953. PEANUT BUTTER. IV. DETERMINATION OF COLOR OF PEANUT BUTTER BY A SPECTRAL REFLECTANCE METHOD
Morris, N. J.; Lohmann, I. J.; O'Connor, R. T.; and Freeman, A. F.
Food Tech. 7: 393-96. (1953)

A reflectance spectrophotometric method was applied to measure the colors of 20 peanut butter samples, ranging in color from light to very dark. This technique affords an objective means of determining color, an important index of quality of peanut butter. Other methods used involve visual comparison, providing only a subjective measurement.

952. PEANUT BUTTER. III. EFFECT OF ROASTING, BLANCHING, AND SORTING ON OIL CONTENT AND FREE FATTY ACIDS OF PEANUTS

Morris, N. J.; Willich, R. K.; and Freeman, A. F.
Food Tech. 7: 366-69. (1953)

Oil and the free fatty acids contents of the oils of raw and roasted peanuts, sorted cotyledons, germs, testa, and peanut butters were determined. Roasting, blanching, and manual sorting increased the apparent oil content of sorted peanuts about 1.5%, on the average for 20 batches. These operations led to reduction in free fatty acids of the sorted peanuts (on the average, about 0.1% less than for the corresponding raw, shelled peanuts). Peanut butters containing stabilizers as well as added salt showed increases in oil content as compared to butters with only added salt.

948. FACTORS AFFECTING THE STABILITY OF CRUDE OILS OF SIXTEEN VARIETIES OF PEANUTS

Fore, S.P.; Morris, N. J.; Mack, C. H.; Freeman, A. F.; and Bickford, W. G.
J. Am. Oil Chemists' Soc. 30: 298-01. (1953)

Composition and stability have been determined simultaneously for crude oils from known varieties of peanuts for the purpose of relating stability to composition. Relations between fatty acid compositions, tocopherol contents, and autoxidative stabilities of 16 crude oils from different varieties of peanuts have been investigated. The relative linoleic acid content is a major factor affecting variations in stabilities. With the exception of the oils from Runner peanuts tocopherol compositions of the oils did not vary significantly, either in the nature and distribution of individual tocopherols, or in total tocopherol contents. The enhanced stability of the oils from the Runner peanuts may be due in part to their higher tocopherol contents. There is some evidence that crude peanut oils contain some nontocopherol antioxidant and/or synergist.

942. PEANUT COMPOSITION IN RELATION TO PROCESSING AND UTILIZATION

Hoffpauir, C. L.
Agr. Food Chem. 1: 668-71 (1953)

Information on kinds and amounts of constituents of kernels, hearts, and red skins--considered basic to research on improving the quality of peanuts in food uses--has been compiled from 67 references

from the world literature on the chemical composition of peanuts, and has been discussed in relation to processing and use. Changes brought about when kernels are roasted to improve aroma, flavor, and palatability are discussed in the light of present information on the reactions taking place.

891. BROAD ASPECTS OF RESEARCH ON UTILIZATION OF EDIBLE PEANUTS
Freeman, A. F.
Peanut J. and Nut World 32 (8): 15, 39-43. (1953)

Conferences held at SRRL with representatives of the peanut industry and researchers of other Federal and State agencies are described. Peanut butter industry representative recommended giving priority to improvement of the quality of raw peanuts and to a search for uses for hulls and for those peanuts that are undesirable for edible uses. Nut-salting and confectionery industries recommended giving priority to improvement of processes for blanching, deep-fat frying, and packaging of peanut products; and that research be conducted also on improving quality of raw peanuts.

889. NOTE ON THE USE OF CALCIUM HYDROXIDE IN THE PREPARATION OF PEANUT PROTEIN
Pominski, J.; and Gordon, W. O.
J. Am. Oil Chemists' Soc. 30: 88-89. (1953)

Laboratory pepitizations showed that between pH of 7.2 and 9.5, nitrogen solubility obtained with calcium hydroxide solution was a constant, and was practically equal to the value obtained with sodium hydroxide solution at pH 7.5. Pilot-plant yields of protein and settling rates of protein curds also were equal.

883. DETERMINATION OF STABILITIES OF CRUDE PEANUT OILS BY ACCELERATED AERATION METHODS
Morris, N. J.; and Freeman, A. F.
Food Tech. 7: 227-8. (1953)

Stabilities of crude peanut oils determined at 110° C. by Mehlenbacher's modification of the active oxygen method (A. O. M.) are compared with those determined by the active oxygen method at 97.8° C. The determination at 110° C. provides a suitable objective method for the determination of stability of crude peanut oils in 40 percent of the time required by use of the active oxygen method at 97.8° C.

843. STABILITY TUBE WITH FOAM BREAKER
Fisher, G. S.; and Morris, N. J.
Anal. Chem. 24: 1384. (1952)

An all-glass stability tube is described which was developed to control excessive foaming during application of the active-oxygen method for the determination of the stability of oils extracted from peanut butter and peanuts. The tube has been used for approximately 2 years satisfactorily.

822. ESTIMATION OF SKIN CONTENT OF PEANUT MEALS AND RELATIVE SKIN PIGMENT CONTENT OF ISOLATED PROTEIN
Stansbury, M. F.; and Hoffpauir, C. L.
J. Am. Oil Chemists' Soc. 29: 370-72. (1952)

The method described is based on the fact that the pigments consist predominantly of a catechol tannin and related compounds. It may be used to estimate the degree of skin removal in preparing meals and evaluating proteins for skin pigment content.

812. PHASE RELATIONS IN THE SOLVENT WINTERIZATION OF MOLECULARLY REARRANGED PEANUT OIL AND COTTONSEED OIL
Boucher, R. E.; and Skau, E. L.
J. Am. Oil Chemists' Soc. 29: 382-85. (1952)

Systematic phase-relation data, obtained to determine the effect of either mild or extensive molecular rearrangement on the winterization behavior of peanut or cottonseed oils, show that if the molecular rearrangement step is introduced before solvent winterization, larger percentages of solid must be removed to obtain a winterized oil, especially for cottonseed oil; lower yields result; lower chilling temperatures and longer chilling periods are required, partly because of a lower rate of crystallization; and the settling qualities of the solid separating are markedly impaired.

806. FLAKE FEEDING DEVICE FOR SOLVENT EXTRACTION OF OIL-BEARING MATERIALS
Gardner, H. K.; D'Aquin, E. L.; Parker, J. S.; and Gastrock, E. A.
Ind. Eng. Chem. 44: 2261-64. (1952)

The device was developed to feed flaked oil-bearing materials to a pilot-plant size solvent extractor: To provide a continuous, uniform discharge of the material which can be varied over a 2.5 to 1 range; to

form a positive seal plug to prevent the escape of solvent vapors at the point of entry of the material; and to cause a minimum breakage of the material into very small particles. The device operated satisfactorily with flakes from cottonseed, peanuts, okra seed, and rice bran, and is of a type suitable for feeding a wide variety of materials other than oilseed flakes or meats. Scaling up to commercial size should be feasible.

754. PRODUCTION OF PEANUT PROTEIN
Pominski, J.; Gordon, W. O.; McCourtney, E. J.; Vix, H. L. E.; and Gastrock, E. A.
Ind. Eng. Chem. 44: 925-28. (1952)

Pilot-plant yields of protein were increased by successive peptizations and also by grinding the meal before one peptization. Operating details are given.

753. COTTONSEED AND PEANUT MEAL GLUES. RESISTANCE OF PLYWOOD BONDS TO CHEMICAL REAGENTS
Hogan, J. T.; and Arthur, J. C., Jr.
J. Am. Oil Chemists' Soc. 29: 16-18. (1952)

The resistance of birch plywood glue bonds using cottonseed and peanut meal or casein to organic and inorganic reagents for periods ranging from 1 to 14 days was determined. It was suggested that the principal attractive forces involved in the protein bonds were ionic or valence forces and that differences observed in the resistance of the glues to the chemical reagents were probably due to variations in the amino acid constitution of the proteins.

750. PEANUT PROTEIN FIBERS - FLOW CHARACTERISTICS OF SPINNING SOLUTIONS AFFECTED BY RATE OF EXTRUSION
Arthur, J. C., Jr.; and Many, H. G.
Am. Dyestuff Reptr. 41: 385-86. (1952)

In the preparation of peanut protein fiber the loss in head in a section of the extrusion system per unit volume of spinning solution delivered decreased with increasing rate of extrusion, indicating that the fluidity of spinning solutions is affected by rate of extrusion. An optimum rate of extrusion was determined for each extrusion system to minimize the loss in energy in the system per unit volume delivered.

736. STABILITY OF COTTONSEED AND PEANUT OILS TO AUTOXIDATION
Dollear, F. G.
Potato Chipper 11(11): 24, 26, 28, 30, 32. (1952)

In a study of the influence of the type and proportion of the various fatty acid components of the glycerides and the presence of natural or added antioxidants, of pro-oxidants, and of synergists and/or metal deactivators on the resistance of cottonseed and peanut oils to autoxidation, it was found that the stability of these oils can be increased by hydrogenation or by the addition of some types of antioxidants.

735. PEANUT BUTTER. II. EFFECT OF ROASTING AND BLANCHING ON THE THIAMINE CONTENT OF PEANUT BUTTER
Willich, R. K.; Murray, M. D.; O'Connor, R. T.; and Freeman, A. F.
Food Tech. 6: 199-200. (1952)

Analyses of raw, shelled peanuts after removal of the testa showed that most of the thiamine was contained in the kernel. Peanut butters made from peanuts roasted to various extents contained only a relatively small proportion of the thiamine originally present in the kernel. With increase of roasting the amounts of thiamine were progressively smaller, while the color of the product became darker. Consequently, color becomes a visual indication of the extent of roasting, and indirectly of the loss of thiamine.

734. PEANUT BUTTER. I. ROASTING, COOLING, BLANCHING, AND PICKING OF PEANUTS
Willich, R. K.; Hall, A. S.; Morris, N. J.; and Freeman, A. F.
Food Tech. 6: 71-73. (1952)

The times and temperatures required for roasting white Spanish peanuts from very light to very dark have been determined, and information has been obtained on the cooling, blanching, and manual sorting of 20 batches of peanuts in relation to their original moisture contents and to the quality of the final product.

733. PRE-TREATMENT OF PEANUT KERNELS FOR EFFECTIVE SKIN REMOVAL
Pominski, J.; D'Aquin, E. L.; Molaison, L. J.; Vix, H. L. E.; and McCourtney, E. J.
J. Am. Oil Chemists' Soc. 29: 48-51. 1952

Best pilot-plant-scale conditions for approximately 98 percent skin removal from U. S. No. 1 shelled Spanish peanuts are: Water-treatment at room temperature, to gain not less than 20 percent moisture, drying with forced circulated air at 120° to 125° F. to approximately 4.5 percent moisture in the peanuts, and blanching in a standard split-nut blancher. Meal prepared by hexane extraction of de-skinned (98 percent), water-treated U. S. No. 1 kernels had color and flavor characteristics superior to other hexane-extracted peanut meals for food utilization. Protein prepared from this meal had a light color.

728. SOLVENT EXTRACTION OF COTTONSEED AND PEANUT OILS. IX. DETERMINATION OF FINES IN MISCELLA
Graci, A. V., Jr.; Crovetto, A. J.; Parker, J. S.; and Reuther, C. G., Jr.
J. Am. Oil Chemists' Soc. 29: 71-73. (1952)

Cottonseed, peanuts, okra seed, and rice bran were used in experiments in which was developed a rapid method of determining the solids content of oil-solvent miscellas. The method is volumetric and replaces the slower gravimetric method. The volumetric determination is converted to weight values by the use of an appropriate curve. The construction of the curve and its application in pilot-plant operations are described.

725. PREVENTION OF OIL SEPARATION IN PEANUT BUTTER. A REVIEW
Freeman, A. F.; and Singleton, W. S.
Peanut J. and Nut World 31(4): 23, 30, 45-46. (1952)

The 27 references reviewed cover methods used for preventing the separation of oil in peanut butter and the history of the development of stabilization of peanut butter. Grinding roasted peanuts by various methods is discussed, especially with respect to the frictional heat imparted to peanut butter and the amount of oil freed from the cell structure of the peanut. Effect of controlling the temperature during grinding and subsequent steps in the manufacture of peanut butter in relation to oil separation is explained.

660. LYE-DIPPING FOR THE REMOVAL OF OBJECTIONABLE SKIN COLOR FROM VARIOUS GRADES OF SHELLED SPANISH PEANUTS
Pominski, J.; McCourtney, E. J.; Stansbury, M. F.; D'Aquin, E. L.; and Vix, H. L. E.
J. Am. Oil Chemists' Soc. 28: 513-16. (1951)

Experimental data have been obtained on the lipids and protein losses in the lye treatment of the various grades of shelled Spanish peanuts. It has been shown that lipid and protein losses on U.S. No. 1

shelled peanuts are lower for the cold than for the hot treatment, though both are of a low level; that these losses in the cold treatment increased with the use of lower grade shelled peanuts, U. S. No. 2 and oil mill stock; that protein solubility of kernels was negligibly affected by lye solution treatment, drying at 125° F., cold solvent extraction with hexane, air-drying, and oven-drying at 125° F.; and that damaged kernels imparted color to protein.

659. PROCESSING VARIABLES IN PEANUT PROTEIN PREPARATION

Pominski, J.; Laborde, E. J.; Cirino, V. O.; and Vix, H. L. E.

J. Am. Oil Chemists' Soc. 28: 508-12. (1951)

A general equation was derived by which yield of protein may be calculated for a solvent-extracted peanut meal at various water-meal ratios. Experiments showed that nitrogen solubility for ground and unground meal increased slowly with temperature but was little affected by the water-meal ratio, and that peptization might be considered complete in 30 minutes. For unground meal yield of protein increased with increase in water-meal ratio. Repeated peptizations and grinding of meal led to increased protein yields.

647. PHASE RELATIONS PERTAINING TO THE SOLVENT WINTERIZATION OF PEANUT OIL IN ACETONE-HEXANE MIXTURES

Boucher, R. E.; and Skau, E. L.

J. Am. Oil Chemists' Soc. 28: 501-04. (1951)

Systematic phase relation data have been obtained on the solvent-winterization behavior of a refined peanut oil in a mixed solvent consisting of 85 percent by weight of acetone and 15 percent of hexane. Graphs are given which show the effect of oil-solvent ratio, chilling temperature, holding-time, and agitation on the percentage of solid removed, the degree of winterization, and the settling qualities of the solid separating. The data afford a preliminary basis for pilot-plant design, selection of optimum conditions, and recognition of limitations for pilot-plant research on the solvent winterization of peanut oil.

553. COTTONSEED AND PEANUT MEAL GLUES: PERMANENCE OF PLYWOOD GLUE JOINTS AS DETERMINED BY INTERIOR AND EXTERIOR ACCELERATED CYCLIC SERVICE TESTS

Hogan, J. T.; and Arthur, J. C., Jr.

J. Am. Oil Chemists' Soc. 28: 272-74. (1951) (Reprints not available)

Data on the strength properties of cottonseed and peanut meal glues in plywood bonds as they are affected by accelerated interior

and exterior cyclic service tests show that cottonseed meal glue is superior to peanut meal glue; (compares favorably with commercial casein glue on an interior test basis for 5 cycles).

643. LIST OF SRRL PUBLICATIONS AND PATENTS, 1944-1950, ON COTTONSEED AND PEANUT PROTEINS AND RELATED SUBJECTS
Anonymous
U. S. Dept. Agr., Bur. Agr. Ind. Chem., AIC-314. Processed. 12 pp. (1951)

Of 71 publications by members of the Southern Utilization Research Branch reporting their accomplishments in research on these proteins, 49 pertain to peanut protein. Of these, 5 articles are reviews of the literature; 13 pertain to protein chemistry; 8 to processing of peanut protein; 2 to nutritional aspects; 4 to the production of peanut protein fiber; 9 to peanut protein composition; and 8 to the production of adhesives and sizes from peanut protein.

549. VISCOSITIES OF COTTONSEED AND PEANUT OIL-HEXANE MISCELLAS IN ENGLISH UNITS
Decossas, K. M.; Deckbar, F. A., Jr.; and Hecker, J. L.
U. S. Dept. Agr., Bur. Agr. Ind. Chem., AIC-304. Processed. 2 pp., illus. (1951)

Constant composition curves of viscosity versus temperature for refined and winterized peanut oil-commercial hexane miscellas are included. Tables of viscosities of miscellas at various temperatures and compositions were converted from data in metric units to English units and plotted as intermediate viscosity-composition isotherms. Readings of viscosity versus temperature taken off these intermediate curves were plotted. Absolute viscosity, as ordinate expressed in pounds per foot-hour, and temperature, t, as abscissa expressed in degrees Fahrenheit, were plotted. These graphs are complementary to others in English units on boiling points, densities, and gravities of oil miscellas.

546. UTILIZATION RESEARCH ON PEANUT MEAL AND PROTEIN AT THE SOUTHERN REGIONAL RESEARCH LABORATORY
Arthur, J. C., Jr.
Peanut J. and Nut World 30(8): 21-22, 53. (1951)

This article summarizes SRRL research, which has demonstrated that peanut meal and protein have many of the properties desired for making new food and industrial products. SRRL has been the only source in this country of pilot-plant quantities of

low-temperature, solvent-extracted peanut meal and protein, and has supplied samples of these products to industrial concerns and university laboratories for nutritional experiments. It is pointed out that additional fundamental information on peanut protein would be advantageous.

580. PEANUT PROTEIN FOR INDUSTRIAL USE
Arthur, J. C., Jr.
Yearbook of Agr., (U. S. Dept. Agr.) 1950-1951. pp. 611-14.

Research directed toward increasing the value of the meal and protein from peanuts, with principal aim of developing industrial products, is discussed. A typical process for separating protein from solvent-extracted peanut meal is described. Several products produced from the peanut meal and protein are described.

506. THERMAL PROPERTIES OF FATS AND OILS. VII. HYDROGENATED AND UNHYDROGENATED PEANUT OILS
Ward, T. L.; and Singleton, W. S.
J. Am. Oil Chemists' Soc. 27: 423-26. (1950)

It is believed that this investigation is the first reported on the heat capacity of peanut oils. A refined and bleached peanut oil was examined calorimetrically before and after hydrogenation. Measurements were made over the entire range of melting. Values for specific heats were used to develop equations relating temperature and specific heat of the oils in both solid and liquid states. The heat of fusion of both samples was also determined. The relative amounts of solid and liquid glycerides in hydrogenated and unhydrogenated peanut oil at various temperatures over their entire melting ranges were estimated from the calorimetric data.

505. THE TANNIN AND RELATED PIGMENTS IN THE RED SKINS (TESTA) OF PEANUT KERNELS
Stansbury, M. F.; Field, E. T.; and Guthrie, J. D.
J. Am. Oil Chemists' Soc. 27: 317-21. (1950)

Red skins (testa) represent from 2.0 to 3.5 percent of peanut kernels and contain tannin and related pigments which will contribute to the presence of undesirable color in the protein preparations. An investigation showed that the tannin is a catechol-type, the purified tannin representing about 7 percent of the weight of the skins. Much smaller quantities of phlobaphene and so-called "leuco-anthocyanic chromogen" were isolated from the skins. Some evidence of

traces of a flavonic-type pigment was obtained. The tannin when refluxed with alcoholic hydrochloric acid gave a water-soluble red pigment which appeared to have an oxonium-type structure. Elementary analyses and certain properties of the isolated tannin and related pigments differed considerably from those reported by previous investigators.

502. PHASE RELATIONS PERTAINING TO THE SOLVENT WINTERIZATION OF COTTONSEED AND PEANUT OILS IN ACETONE

Skau, E. L.; Burleigh, E. G.; Banowetz, L. F.; and Dopp, W. N.

J. Am. Oil Chemists' Soc. 27: 556-64. (1950)

Systematic physical-chemical data on the solvent-winterization behavior of cottonseed and peanut oils with acetone have been obtained which should serve as a basis for selecting the conditions necessary for the effective solvent winterization of these oils in acetone. The two oils are only partly miscible with acetone below certain temperatures which have been determined. In peanut oil this phenomenon may interfere with the winterization process within a certain range of concentrations. It seems probable that if acetone were used as the winterization solvent for peanut oil, the separation into two liquid layers and the sensitivity of this phenomenon to moisture might be a source of processing difficulties especially if filtration instead of centrifugation were used to separate the solid from the supernatant.

501. EXPANSIBILITY AND SPECIFIC VOLUME OF STABILIZED AND UNSTABILIZED PEANUT BUTTER

Singleton, W. S.; and Freeman, A. F.

Food Research 15: 297-301. (1950)

Peanut butter of 3 different compositions was examined dilatometrically. From data on expansibility and absolute density, absolute specific volume of each peanut butter was calculated for various temperatures from -38.6° to 70.0° C. No evidence of polymorphic transformations was obtained, regardless of rates of cooling of the samples. The reported data may be applied to the calculation of the shrinkage of peanut butter which may occur after packaging as a result of natural cooling of the product to room temperature.

492. DENSITIES AND GRAVITIES OF COTTONSEED AND PEANUT OIL MISCELLAS IN ENGLISH UNITS

Decossas, K. M.; Deckbar, F. A., Jr.; and Hecker, J. L.
U. S. Dept. Agr., Bur. Agr. Ind. Chem., AIC-292.
Processed 2 pp., illus. (1950)

Data in the literature on density-temperature-constant composition parameters for refined and winterized peanut oil-commercial hexane miscellas are replotted in English units; namely, densities in pounds per cubic foot and per gallon, and temperatures in degrees Fahrenheit. The specific gravities are calculated on a basis of the density of water at 60° F. These plots complement those in English units on boiling points of cottonseed and peanut oil miscellas. Replotting these data will render them more useful and suitable for design calculations, plant operations, and interpretations of operating data.

487. PEANUT PROTEIN FIBERS -- PILOT-SCALE PLANT

Arthur, J. C., Jr.; and Many, H. C.
Am. Dyestuff Reptr. 39: 719-22. (1950)

The construction and operation of a pilot-scale fiber-spinning plant are described and typical operating data for the plant are presented.

462. HEAT CAPACITY OF STABILIZED PEANUT BUTTER

Ward, T. L.; Singleton, W. S.; and Freeman, A. F.
Food Research 15: 146-49. (1950)

A calorimeter was modified and used to measure the heat capacity of peanut butter. The heat capacity of a sample of peanut butter which had been rapidly cooled after emerging from the grinding mill was 0.075 calorie per gram higher than the same sample when slowly cooled, up to the final melting of the added hard fat which was present in the sample. Identical heat capacities were observed above 19° C., regardless of the rate of cooling of the sample. An equation was developed for expressing the heat capacity of peanut butter in the range 20° to 80°, which is $C_p = 0.361 + 0.0012\,t$.

458. ISOLATION OF XANTHINE, GUANINE, ADENINE, PROTEOSE, OLALIC ACID, AND GLUTATHIONE FROM PEANUT KERNELS
Reeves, W. A.; and Guthrie, J. D.
Arch. Biochem. 26(2): 316-18. (1950)

Xanthine, guanine, and adenine, a proteose, and oxalic acid were isolated from the supernatant liquid remaining after the precipitation of peanut protein. X-ray diffraction data were obtained for xanthine and for the gold chloride double salts of guanine and adenine. Glutathione was isolated from an alcoholic extract of peanut kernels. None of these substances have been previously isolated from peanut kernels.

452. ELECTROPHORETIC ANALYSIS OF PEANUT AND COTTONSEED MEALS AND PROTEINS
Karon, M. L.; Adams, M. E.; and Altschul, A. M.
J. Phys. and Colloid Chem. 54(1): 56-66. (1950)

Cottonseed and peanut meals and the derived proteins were analyzed by means of the Tiselius electrophoresis apparatus. The effects of method of extraction of the protein and of the buffer and pH of the buffer solutions were investigated. By fractional precipitation involving a change of ionic strength, the two major components of cottonseed protein can be concentrated to above 80 percent purity. Approximately 75 percent of peanut protein consists of two components. These migrate as a single entity, unless the meal has been pre-washed to remove soluble sugars and phytin, in which case the two major components separate into two almost equal fractions.

447. BOILING POINTS OF COTTONSEED AND PEANUT OIL MISCELLAS IN ENGLISH UNITS
Decossas, K. M.; Mackey, H. A.; and Houghan, G. F.
U. S. Dept Agr., Bur. Agr. Ind. Chem., AIC-257. 2pp., illus. Processed. (1950)

Data in the literature on boiling point vapor pressure-constant composition parameters for crude cottonseed oil-commercial hexane miscellas and crude peanut oil-commercial hexane miscellas have been plotted in inches of mercury vacuum and in degrees of temperature Fahrenheit to make them more useful and suitable for design calculations, plant operations, and interpretations of operating data. Constant composition parameters are at 0, 50, 60, 70, 80, 85, 90, 93, 95, 97, and 98 percent oil by weight.

635. PREPARATION OF PEANUT PROTEIN FREE FROM PEANUT SKIN PIGMENTS
Burnett, R. S.
U. S. Patent No. 2,463,740. March 8, 1949.

Shelled, unskinned kernels are exposed for a few seconds to a dilute aqueous alkaline solution to remove pigment from the skins, then are washed, partly dried, and separated into oil and light-colored meal, from which a high-quality protein may be obtained. Also described is similar removal of soluble pigments in kernels by a few seconds' exposure to dilute acid.

456. ABSTRACT BIBLIOGRAPHY OF THE CHEMISTRY AND TECHNOLOGY OF PEANUTS, 1830-1939
Morris, N. J.; and Dollear, F. G.
U. S. Dept. Agr., Bur. Ind. Chem., AIC-151. Processed. 231 pp. (1949)

This is a compilation of abstracts of more than 600 references, published from 1830-1939, with references arranged under these subject divisions: (1) Peanuts--agronomy, analysis and composition, food products, nutrition, processing, protein and enzymes; (2) peanut cake--analysis, feed, nutrition, utilization; (3) peanut oil--adulteration and detection, chemical and physical properties, nutrition, processing, stability, utilization; (4) peanut shells and byproducts; (5) miscellaneous. Included are subject and author indexes. A widespread demand for copies has testified to the significance of this bibliography for all who are interested in peanut utilization.

418. MODIFICATION OF VEGETABLE OILS. VIII. CONVERSION OF MONOESTERS OF PEANUT OIL FATTY ACIDS TO TRIGLYCERIDES
Gros, A. T.; and Feuge, R. O.
J. Am. Oil Chemists' Soc. 26: 704-09. (1949)

Conversion of the methyl and ethyl esters of peanut oil fatty acids into triglycerides through alcoholysis and ester-ester interchange reactions was investigated to establish the conditions for the most rapid and complete transformation. The most effective catalysts for alcoholysis were barium hydroxide, lithium hydroxide, sodium ethylate, and sodium hydroxide. When equivalent quantities of monoesters were allowed to interact, the initial rate of alcoholysis was influenced markedly by the temperature and concentration of catalyst and to some extent by the pressure. Monoesters were converted fairly completely into triglycerides by reacting with an excess of glycerol and then

decomposing the resulting glycerides by heating and stripping with steam under low pressure. Ester-ester interchange reactions using triacetin and methyl or ethyl esters did not proceed as well as has been reported in the literature.

413. PEANUT PROTEIN FOR WINDOW SHADE SIZES
Arthur, J. C., Jr.; and Cheng, F. W.
Am. Dyestuff Reptr. 38: 535-37. (1949)

Experiments indicate the suitability of peanut protein for use as a sizing material in window shade manufacture and in similar applications. In the laboratory, cotton muslin sized with peanut protein solutions showed tensile and flexibility characteristics similar to those of samples sized commercially with animal glues. Peanut protein also is satisfactory for many other adhesive uses. The cost of isolating and processing peanut protein compares favorably with the cost of producing other industrial proteins, and the potential supply is large.

412. PEANUT PROTEIN FOR INDUSTRIAL UTILIZATION. A LITERATURE SURVEY
Arthur, J. C., Jr.
J. Southern Res. 1(4): 3-14. 1949.
Condensed version. Evaluation of Peanut Protein for Industrial Utilization: A Review:
J. Am. Oil Chemists' Soc. 26(11): 668-71. (1949)

Reviewed are 136 references on commercial and laboratory processes for producing peanut meal, extracting and isolating protein, and producing and evaluating products made from the protein. Solvent-extracted peanut meal is a good source of protein for industrial products. Physico-chemical properties of peanut protein fractions in collodial solutions determine industrial applications. Procedures have been established by the Southern Utilization Research Branch for determining solubility of protein in different solvents; nitrogen and ash contents; color of protein dispersed in sodium hydroxide solutions; viscosity characteristics of concentrated protein solutions; and properties of specific products made from protein.

411. MORE PRODUCTS FROM PEANUTS
Arthur, J. C., Jr.
Mfrs. Rec. 118(10): 40-1. (1949)

Research at SRRL directed towards increasing the value of peanut oil and meal is reviewed. Pilot-plant manufacture of peanut protein and its use in making a soft, wool-like, cream-colored fiber and

such adhesive products as plywood glue, rewettable glues, paper-coating binders, and window shade sizes are described. Commercial development of these industrial products from peanuts will depend on commercial availability of peanut meal of certain specifications.

395. HYGROSCOPIC EQUILIBRIUM OF PEANUTS
Karon, M. L.; and Hillery, B. E.
J. Am. Oil Chemists' Soc. 26: 16-19. (1949)

The hygroscopic equilibrium curve for whole peanuts--obtained over a range of 11 to 93 percent relative humidity at 25° C.--proved to be similar to that of cottonseed. All samples investigated (regardless of variety or the manner in which they were dried) exhibited very similar results. In the whole peanut, the shells contained more moisture than the kernels; however, the kernels contained a large percentage of oil, which is responsible for some of the observed differences in moisture content. In the kernel the skins contained the greatest percentage of moisture at constant relative humidity. Circulation of air over the samples and a raise in temperature to 35° greatly increased the rate at which hygroscopic equilibirum was attained.

392. MODIFICATION OF VEGETABLE OILS. VII. ALKALI-CATALYZED INTERESTERIFICATION OF PEANUT OIL WITH ETHANOL
Feuge, R. O.; and Gros, A. T.
J. Am. Oil Chemists' Soc. 26: 97-102. (1949)

The alkali-catalyzed displacement of the glycerol in a fat by methanol or ethanol is an important reaction in fat and oil technology. The reaction simplifies the manufacture of some soaps, is valuable in conjunction with processes for fractionating fatty acids, and potentially is important in producing mono- and diglycerides of unsaturated acids, and presents possibilities in the field of "tailor-made" fats. In this article, data are presented to show the actual rate of alcoholysis and how it is affected by the concentration of catalyst and alcohol, as well as the rate of catalyst disappearance through saponification. The formation of mono and diglycerides during the course of alcoholysis and the mechanism of the reaction are discussed in terms of the composition of the reaction product.

355. STORAGE OF COTTONSEED AND PEANUTS UNDER CONDITIONS WHICH MINIMIZE SPECTROPHOTOMETRIC CHANGES IN THE EXTRACTED OIL

Pons, W. A., Jr.; Murray, M. D.; O'Connor, R. T.; and Guthrie, J. D.
J. Am. Oil Chemists' Soc. 25: 308-13. (1948)

This work was undertaken in an effort to establish new indexes of deterioration and to further verify previous recommendations for the storage of cottonseed and peanuts. Oil extracted from peanuts stored for more than 4 years at room temperature showed a much greater absorption in the region of 227 to 234 mμ than oil from peanuts stored at 1° or at -18° C.

353. CONTINUOUS SOLVENT EXTRACTION OF COTTONSEED AND PEANUTS AT THE SOUTHERN REGIONAL RESEARCH LABORATORY

Gastrock, E. A.; and D'Aquin, E. L.
Oil Mill Gaz. 55(4): 13-21. (1948)

The Southern Laboratory's pilot plant equipment for studying continuous solvent extraction of oilseeds is described, and the course of the solvent and meal in the process is followed diagrammatically. Various difficulties encountered before relatively smooth operation of the plant was achieved are enumerated, along with the steps taken to overcome them. In the later runs, both cottonseed and peanut flakes were extracted to a content of 1 percent, or less, of residual oil. Methods are given for the preparation for extraction of both cottonseed and peanut flakes.

350. THE NUTRITIVE VALUE OF PEANUT CAKE, MEAL, PROTEIN AND NONPROTEIN RESIDUE FOR CHICKS

Altschul, A. M.; Irving, G. W., Jr.; Guilbeau, W. F.; and Schaefer, H. C.
Poultry Sci. 27: 402-07. (1948)

The nutritive value of peanut meals, isolated protein fractions and protein meal residues obtained by various processing methods was investigated in comparison with soybean and cottonseed meals as the supplement in chick starting diets. The feeding experiments are described in detail, and the results tabulated. Used as about one-fourth of the protein supplement in an otherwise adequate diet, peanut meals supported chick growth as well as commercial screw-pressed soybean meal, and were only slightly inferior to commerical

hydraulic-pressed cottonseed meal. Solvent-extracted peanut meal had the same nutritional value as hydraulic-pressed peanut meal. Peanut protein preparations produced gains in weight similar to those obtained by feeding the original peanut meals. The residue remaining after extraction of protein from solvent-extracted peanut meal supported growth, but had less nutritional efficiency, expressed as the amount of feed required to produce a unit gain in weight, than either peanut meal or isolated peanut protein.

345. PILOT-PLANT MANUFACTURE OF PEANUT PROTEIN
Arthur, J. C., Jr.; Crovetto, A. J.; Molaison, L. J.; Guilbeau, W. F.; and Altschul, A. M.
J. Am. Oil Chemists' Soc. 25(11): 398-400. (1948)

An improved, simplified process for producing higher yields of protein from solvent-extracted peanut meal is described. As the rate of addition of sulfur dioxide was increased, and the temperature of the extract liquor decreased, density and settling rate of the protein curd increased. Spray washing of the extracted meal was more efficient than the dilution method of washing, and increased yield of protein.

344. PEANUT PROTEIN PAPER COATINGS
Arthur, J. C.; Mason, T. W., Jr.; and Adams, M. E.
J. Am. Oil Chemists' Soc. 25: 338-40. (1948)

Paper when coated with peanut protein adhesive and mineral pigments gave high wax pick tests. Using neutralized protein as the adhesive, coating slips containing 40 percent solids were prepared with pH values as low as 6.3; and when these slips were applied to raw stock, the coating had wax pick values satisfactory for many printing operations. Over a pH range of 8 to 12, coatings prepared from unwashed protein gave high wax pick values; those prepared with water-washed protein, slightly lower values.

319. DIFFUSION PHENOMENA IN SOLVENT EXTRACTION OF PEANUT OIL
Fan, H. P.; Morris, J. C.; and Wakeham, H.
Ind. Eng. Chem. 40(2): 195-99. (1948)

Theory of diffusion extraction of oil from a porous solid is examined in the light of previous investigations on solvent extraction of oilseeds. Peanut kernels were prepared and extracted in such a manner as to meet the conditions required by Fick's law. The diffusion coefficient under these conditions varies with solvent

and with the moisture content of the oilseeds, but is essentially independent of the thickness of the peanut sections extracted. Results with peanut sections follow theory closely when the broken cells at the surfaces and the void spaces due to moisture loss are considered. Techniques and conclusions presented may help in studying extraction from other oilseed systems.

289. STORAGE OF COTTONSEED AND PEANUTS UNDER CONDITIONS WHICH MINIMIZE CHANGES IN CHEMICAL COMPOSITION
Stansbury, M. F.; and Guthrie, J. D.
J. Agr. Research 75(2): 49-61 (1947)

Analysis of peanut samples stored at room temperature, 0° C., and -18° C. showed that unshelled peanuts may be stored for more than 2 years in closed cans at 1° or below without appreciable change in total nitrogen and oil contents of kernels, free fatty acid content, and iodine number of the oil.

288. THE ROLE OF CHEMISTRY IN ADAPTING PEANUTS TO NEW USES
Scott, W. M.
Peanut J. and Nut World 27(1): 47-8, 90-2. (1947)

Emphasis is placed on products obtained from peanut protein, such as a wool-like fiber and several adhesive materials. Special procedures for solvent extraction of peanuts are described which result in essentially oil-free, solvent-free meal containing high-quality protein, suitable as a source for these new, useful products. Research on the properties of peanut oil is discussed, and plans to initiate research on peanut butter are mentioned. Earlier wartime research is summarized.

286. ETHANOL-EXTRACTABLE NONPROTEIN MATERIAL IN PREPARATIONS OF PEANUT PROTEIN
Hoffpauir, C. L.; and Guthrie, J. D.
J. Am. Oil Chemists' Soc. 24: 393-97. (1947)

Steps in the preparation of protein from solvent-extracted peanut meal and the nature and amounts of nonprotein constituents extracted by cold ethanol at the curd stage are discussed. Moisture, ash, nitrogen, phosphorus, and lipids contents of original meal samples, meal residues, and the air-dried and alcohol-washed proteins are reported.

262. VEGETABLE PROTEIN HYDRATES
Burnett, R. S.; and Roberts, E. J.
U. S. Patent No. 2,421,113. May 27, 1947.

A process for preparing fluid, comparatively stable, and relatively clear vegetable protein hydrates consists of forming a mixture of water and protein, the quantity of water being about 50 percent of the hydrate, which has a pH of about 7.0.

260. PEANUT PROTEIN FIBER: ITS POSITION IN THE PROTEIN FIBER WORLD
Scott, W. M.
Chemurgic Dig. 6(12): 192-95. (1947)

The status of various protein-based synthetic fibers is surveyed. Production of the peanut protein fiber "Sarelon" at the SRRL and economic and technological aspects of the production of synthetic protein fibers are discussed. The major problem in utilizing certain oilseeds is obtaining a meal of satisfactory quality in commercial quantities.

257. SOLVENT EXTRACTION OF COTTONSEED AND PEANUT OILS. IV. PILOT PLANT BATCH EXTRACTIONS
Pominski, J.; Molaison, L. J.; Crovetto, A. J.; D'Aquin, E. L.; Westbrook, R. D.; and Guilbeau, W. F.
Oil Mill Gaz. 51(12): 33-39. (1947)

Experience gained in batch solvent extraction of cottonseed and peanuts is reported. The portable batch solvent extraction plant and apparatus used are described and illustrated, and typical extraction data obtained are tabulated. Batch extraction has been found indis- for preparing relatively large batches of oils and of defatted cottonseed and peanuts and other oilseeds for use in pilot-plant work and in chemical, nutritional, protein, and other investigations. The plant has proved a valuable tool for obtaining pertinent processing and development data, including information on equipment and operating methods.

232. PROCESS OF RECOVERING PEANUT PROTEIN
Irving, G. W., Jr.; Merrifield, A. L.; Burnett, R. S.; and Parker, E. D.
U. S. Patent No. 2,405,830. August 13, 1946.

Different protein fractions can be produced from peanut meal by adjusting the pH of an aqueous extract of proteins obtained from

substantially oil-free peanut meal to specific values in succession and removing the protein fractions thus precipitated at each pH value. Proteins are obtained which have widely different physical and chemical characteristics and are suitable for a variety of uses in adhesives, sizes, paper coatings, cold water paints, films, and fibers.

225. FIBER FROM PEANUT PROTEIN. I. THE PRODUCTION AND PROPERTIES OF SARELON
Merrifield, A. L.; and Pomes, A. F.
Textile Res. J. 16: 369-77. (1946) (Reprints not available)

A fiber (Sarelon) is described which has been spun from peanut protein by a "wet" process in a manner similar to that employed for viscose rayon production. A specially designed apparatus which permits the spun fiber to be stretched and strengthened and the general methods of manufacture are described. Sarelon is light cream-colored in its natural state, has a soft hand and a warmth similar to that of wool, and an affinity for dyes normally used on protein fibers and may be dyed with vat and direct cotton dyes. When dibutyl tartrate, diglycol laurate, and oil were employed in the protein spinning solution and when the resulting fiber was after-treated in a solution of sodium chloride, hydrochloric acid, and formaldehyde, the fiber had a dry strength of 0.67 gram per denier, a wet strength of 0.18 gram per denier, and dry and wet elongations of 11.8 and 22.0 percent, respectively.

219. PROTEIN-PHYTIC ACID RELATIONSHIP IN PEANUTS AND COTTONSEED
Fontaine, T. D.; Pons, W. A., Jr.; and Irving, G. W., Jr.
J. Biol. Chem. 164(2): 487-507. (1946)

The protein-phytic acid solubility relation over a wide pH range has been determined for peanut and cottonseed meals and for the dialyzed meals and isolated proteins, and the theoretical and practical significance of the acid relation is discussed. Some comparative data on soybean meal are included. A few characteristics of the phytase present in the meals are described. The data establish that the naturally occurring phytic acid in seed meals is responsible for the suppression of the solubility of the seed meal proteins at pH values below their isoelectric points.

217. PEANUT-MEAL PLYWOOD GLUE
Burnett, R. S.; and Parker, E. D.
Trans. Am. Soc. Mech. Eng. 68(October): 751-56. (1946)

Specifications have been established for a peanut meal suitable for use in preparing plywood glue; a satisfactory glue formula has been developed; and information has been obtained concerning the behavior of the glue under varying conditions. Maximum cooking temperatures of 210° to 215° F. for 76 to 80 minutes. produced a suitable meal in experiments; but each mill has to determine its own most favorable conditions of time and temperature for preparing the specified meal. The dry and wet plywood shear test, the block shear test, and the measurement of viscosity show that peanut meal glue of the formula given meets requirements established for casein and casein-type glues. A plant-scale formula with details for preparing the glue mixture is given.

197. PEPTIZATION OF PEANUT AND COTTONSEED PROTEINS. EFFECT OF DIALYSIS AND VARIOUS ACIDS
Fontaine, T. D.; Irving, G. W.; and Markley, K. S.
Ind. Eng. Chem. 38: 658-62. (1946)

While the shapes of the pH- peptization curves for cottonseed and peanut meals differ, the response of their proteins to the removal of dialyzable meal constituents is the same, showing that naturally occurring substances present decrease markedly the peptizability of the meal nitrogen at certain acid pH values but exerts no effect at alkaline pH values.

195. MANUFACTURE AND USE OF PEANUT PROTEIN
Burnett, R. S.
Chem. Eng. News 24: 478-80. (1946)

The preparation of peanut protein, useful in making adhesives and fibers, by alkali extraction of solvent-extracted or hydraulic-pressed peanut meal is described. To obtain satisfactory color in the extracted protein, either white-skinned peanuts must be used or, before processing the kernels for oil and meal the red color may be removed from the skins. A flow sheet is given and processing costs are estimated.

34. OIL AND MEAL YIELDS IN PEANUT MILLING
Dollear, F. G.; Hoffpauir, C. L.; and Feuge, R. O.
Oil and Soap 23(2): 45-8. (1946)

A continuous processing test was made in a commercial (hydraulic press) oil mill to determine the nature and amount of the so-called invisible oil loss which has been reported to occur in milling peanuts. Three hundred and thirty tons of farmers' stock peanuts were crushed for oil and all products entering and leaving the mill were weighed, sampled, and analyzed. The yields of oil and meal were compared with the yields predicted on the basis of chemical analysis. Under the conditions of this processing test run no so-called invisible oil loss was observed.

157. U. S. MANUFACTURERS OF EQUIPMENT FOR PROCESSING COTTONSEED AND PEANUTS INTO OIL, MEAL AND BYPRODUCT
Anonymous
U. S. Dept. Agr., Bur. Agr. Ind. Chem. AIC-98. Processed. 8 pp. (1945) Revised 1947

This is an alphabetical list of most of the manufacturing companies serving processors of cottonseed and peanuts. A cross listing is given under the type of equipment manufactured.

154. SOLVENT EXTRACTION OF COTTONSEED AND PEANUT OILS. BOILING POINT-VAPOR PRESSURE-COMPOSITION RELATIONS FOR MISCELLAS OF OILS IN HEXANE
Pollard, E. F.; Vix, H. L. E.; and Gastrock, E. A.
Ind. and Eng. Chem. 37: 1022-26. (1945)

Boiling points and densities of mixtures of cottonseed and peanut oils with commercial hexane are useful in the design of vacuum evaporators and strippers and for control operations involving temperature, time of heating, and concentration of oil-solvent mixtures of various compositions, to prevent or minimize fixation of objectionable coloring matter or other deteriorative heat effects. Boiling-point data are determined at various concentrations of crude cottonseed oil and crude peanut oil, over a range of pressures from 160 to 760 mm. absolute in commercial hexane. The effect of agitation in establishing equilibrium conditions of the oil-solvent mixtures is noted.

152. SPECTROPHOTOMETRIC ESTIMATION OF SOYBEAN OIL IN ADMIXTURE WITH COTTONSEED AND PEANUT OILS
O'Connor, R. T.; Heinzelman, D. C.; and Dollear, F. G.
Oil and Soap 22(10): 257-63. (1945)

This spectrophotometric method permits an accurate determination of linolenic acid in a mixture of soybean oil with either cottonseed or peanut oil for use as a criterion of the economic value of an oil mixture and as a guide in oil processing. The precision of the method is limited by variation in composition of the oils in the mixtures.

150. FOOD YEAST GROWTH OF PEANUT PROTEIN WASTE LIQUORS
Klatt, T. J.; Parker, E. D.; Pomes, A. F.; and Porges, N.
Oil and Soap 22(1): 319-21. (1945) (Reprints not available)

Peanut protein waste liquor supplemented only with an ammonium salt was an excellent medium for the propagation of the food yeasts, Torulopsis utilis, in batch and continuous processes. With nitrogen to give a carbon nitrogen ratio of 8:1, 100 grams of sugar yielded 48 grams of a high-protein yeast that was comparable in food value and vitamin content to food yeasts from other sources.

149. ELECTROPHORETIC INVESTIGATION OF PEANUT PROTEINS I. PEANUT MEAL EXTRACT, ARACHIN AND CONARACHIN
Irving, G. W., Jr.; Fontaine, T. D.; and Warner, R. C.
Arch. Biochem. 7: 475-89. (1945)

The homogeneity of peanut proteins and of arachin and conarachin was studied electrophoretically. Peanuts contain 2 major protein components in an approximately 7:1 ratio, totalling 87 percent of the protein content, and two minor components in equal amounts. Arachin, comprising 63 percent of the protein, consists of both major components; conarachin, 33 percent, contains 80 percent of the major component and 20 percent minor components.

148. PURIFICATION AND PROPERTIES OF ARACHIN, A NEWLY DISCOVERED PROTEOLYTIC ENZYME OF THE PEANUT
Irving, G. W., Jr.; and Fontaine, T. D.
Arch. Biochem. 6: 351-64. (1945)

Purified solutions of arachin were prepared that are about 20 times more potent than those of peanut meal. Arachin is present in cotyledons and germs, but not in the skin. Common substances employed to activate most enzymes had no effect on the hydrolytic action of arachin on benzoyl-l-arginino amide.

146. DETERMINATION OF MOISTURE IN PEANUT KERNELS
Hoffpauir, C. L.
Oil and Soap 22(11): 283-86. (1945)

An investigation of conditions (time, temperature, and pressure) needed in oven methods of determining moisture in peanut kernels, to obtain the same values when using either whole or ground kernels and either 50-g. or 5-g. ground samples, indicated that original moisture should be determined on whole kernels and second moisture on 19-tooth or similarly ground kernels by heating for 5 hours in a forced draft oven at 130° C. Some values indicated that heating for 3 hours at that temperature may be adequate for the second moisture determination. This study provided the basis for the adoption by the American Oil Chemists' Society of the official method for the determination of moisture of peanuts and for the trading rules of the National Cottonseed Products Association for peanuts.

145. ELECTROPHORETIC INVESTIGATION OF PEANUT PROTEINS. II. COMPOSITION OF SEVERAL PEANUT PROTEIN FRACTIONS
Fontaine, T. D.; Irving, G. W., Jr.; and Warner, R. C.
Arch. Biochem. 8: 239-49. (1945)

Electrophoretic analyses are presented of the protein preparations obtained by precipitation from peanut meal extracts at pH 4.5; of the small amount of the protein fraction remaining in the mother-liquor; and of the fractions obtained by precipitation from peanut meal extracts. Electrophoretic composition and physical properties and the high yields of these fractions which can be obtained, suggest the applicability of certain fractions in food products or in the preparation of adhesives and fibers.

144. IMPROVEMENT IN THE COLOR OF PEANUT AND COTTONSEED PROTEINS

Fontaine, T. D.; Detwiler, S. B., Jr.; and Irving, G. W., Jr.
Ind. Eng. Chem. 37: 1232-36. (1945)

Protein preparations as light or lighter in color than commercial samples of soybean protein can be obtained from the meals of white-skinned and blanched, red-skinned peanuts, without the use of bleaching agents. The color of proteins prepared from meals of unblanched red-skinned peanuts is improved through controlled protein extraction and precipitation techniques and by washing precipitates with organic solvents such as dioxane, acetone, and methyl ethyl ketone.

142. VISCOSITY PATTERNS OF PEANUT PROTEIN SOLUTIONS: COMPARISON WITH OTHER VEGETABLE PROTEINS AND WITH CASEIN

Burnett, R. S.; Roberts, E. J.; and Parker, E. D.
Ind. Eng. Chem. 37: 276-81. (1945)

Data are presented showing the influence on viscosity of peanut-protein solutions, made alkaline with sodium hydroxide, of concentration, heat, time, pH, and other factors, in turn affected by the methods employed in the preparation of the peanut meal and the separation and subsequent treatment of the protein. Viscosity behavior of solutions of peanut protein is compared with that of soybean and cottonseed proteins.

141. PEANUT PROTEIN HYDRATES. UTILIZATION AS TACKY AND REMOISTENING ADHESIVES

Burnett, R. S.; Parker, E. D.; and Roberts, E. J.
Ind. Eng. Chem. 37: 980-82. (1945)

Glues have been prepared from peanut protein isolated from solvent-extracted or hydraulic-pressed peanut meals, whose rewettability, tackiness, and flow properties make them suitable for purposes for which vegetable proteins have previously been considered unsuitable. Readily soluble glues can be prepared from isoelectric peanut protein curds by neutralizing the curds before they are dried. Dewatering curds to the amount of water in the hydrate reduces drying costs and provides a glue of relatively uniform ash content.

140. PEANUT PROTEIN HYDRATES. PREPARATION AND PROPERTIES
Burnett, R. S.
Ind. Eng. Chem. 37: 861-64. (1945)

Peanut protein hydrates, capable of binding increasing amounts of water, from 30 to about 70% by weight of the sol, as the pH value of the system is increased from 4.5 to 9.0, are tacky, and at pH values near neutrality have characteristics making them suitable for use as adhesives, provided the protein used is isolated from the meal with a minimum of alteration by heat or alkali.

80. SURVEY OF THE CHEMICAL COMPOSITION OF COTTON FIBERS, COTTONSEED, PEANUTS, AND SWEETPOTATOES. A LITERATURE REVIEW
Guthrie, J. D.; Hoffpauir, C. L.; Steiner, E. T.; and Stansbury, M. F.
U. S. Dept. Agr., Bur. Agr. Ind. Chem., AIC-61. Processed. 36 pages. Revised 1949; 116 pp.
Peanut section republished under the title Chemical Composition of Peanuts: A literature review, Peanut J. and Nut World 24(6): 26-30. (1945)

This review, including 134 references on peanuts, has a two-fold purpose: To present information on the composition in a convenient and useful form, and to show where knowledge of the composition is inadequate or lacking -- so that efforts can be made in utilization research to fill the gaps, since the composition of a commodity affects its uses. References on peanuts are discussed under these subject divisions: kernel and press cake; testa (skins); shells or hulls. This survey reveals that knowledge of the composition of peanuts (as of 1944) is inadequate.

105. VISCOSITIES AND DENSITIES OF HYDROGENATED PEANUT OILS
Magne, F. C.; and Wakeham. H.
Oil and Soap 21(12): 347-49. (1944)

Information on viscosities and densities of vegetable oils helps in the design of processing equipment and in research to extend the uses of these oils. Variations in viscosities and densities of unhydrogenated and hydrogenated peanut oils with variations in iodine value and temperature have been systematically investigated.

Curves plotting viscosity versus temperature for oils of different iodine values were used to plot viscosity versus iodine value. These data may be applied in determining the viscosity of any refined or hydrogenated peanut oil of which the iodine value is known. The work confirmed that at a given temperature viscosity decreases with increasing iodine value.

99. RESEARCH ON PEANUTS AND PEANUT PRODUCTS AT THE SRRL
Markley, K. S.
Peanut J. and Nut World 14(1): 55, 57. (1944)

The history of the establishment of the 4 regional laboratories is traced, and the plant of SRRL is described and the following examples of its research are given: Research demonstrated that peanut oil can be hydrogenated so that part of it resembles olive oil in the properties required for use as a textile lubricant. The stability of peanut oil was improved; and data were obtained regarding thermal, dilatometric, and plastic properties of peanut oil. The influence of iodine number and temperature on the viscosity and density of refined and hydrogenated peanut oil was investigated, as a basis for use in the design of oil processing equipment. Certain methods for the analysis of peanut products were improved. The structure and composition of peanut meal and protein were investigated, and methods developed for making adhesives and a fiber from peanut protein. Peanut kernels were analyzed to determine the relation between U. S. Standards for farmers' stock peanuts and their chemical composition.

78. ANALYSES OF PEANUT KERNELS WITH RELATION TO U. S. STANDARDS FOR FARMERS' STOCK PEANUTS
Stansbury, M. F.; Guthrie, J. D.; and Hopper, T. H.
Oil and Soap 21(8): 239-47. (1944)

Analyses of peanut kernels of Spanish, Runner, and Virginia types (1942 crop) indicated that all peanuts of U. S. No. 1, No. 2, and No. 3 farmers' stock grades grown under similar environmental conditions will yield oil and nitrogen at almost the same rate in proportion to the total percentage of kernels after shelling; and the oil obtained from various lots of such peanuts will be of about the same quality from a refining standpoint. Reasonably small percentages of small shriveled kernels did not noticeably lower yield of oil and nitrogen, but samples composed entirely of small shriveled kernels contained only about three-fourths as much oil as did sound mature kernels. This study has resulted in trading of peanuts for oil milling on the basis of U. S. grades.

72. MOLECULARLY DISTILLED PEANUT OIL ANTIOXIDANTS AND PURE ALPHA-TOCOPHEROL AS STABILIZING AGENTS FOR FATS OF POOR KEEPING QUALITY
Oliver, G. D.; Singleton, W. S.; and Bailey, A. E.
Oil and Soap 21(7): 180-93. (1944)

Peanut oil, although not one of the richer sources of tocopherol, becomes extremely stable upon hydrogenation. Molecularly distilled concentrates of peanut oil antioxidants and pure alpha-tocopherol were tested as stabilizers of lard and of abnormal peanut oil products of poor stability. Neither the peanut oil concentrates nor alpha-tocopherol was effective in improving the stability of the abnormal peanut oils, indicating that poor keeping quality, when encountered, is not generally due simply to a deficiency in tocopherols or related antioxidants. Both alpha-tocopherol and peanut oil antioxidants stabilized lard in concentrations up to about 0.06 percent.

71. PROPERTIES OF PEANUT MEAL; INFLUENCE OF PROCESSING FACTORS
Fontaine, T. D.; Samuels, C. S.; and Irving, G. W.
Ind. Eng. Chem. 36: 625-27. (1944)

Specific information of interest to peanut processors is presented on the proper processing conditions under which sufficient oil can be removed with the least alteration in the meal proteins. Data are presented on the effects of temperature, humidity, and length of processing treatment on the peptizability of the nitrogenous constituents of solvent-extracted peanut meal and of flaked raw peanuts. The critical denaturation temperature for peanut protein in the meal, as measured by peptization, lies above 118° C. (dry heat) and above 80° relative humidity.

58. COMMERCIAL PEANUT MEAL; PEPTIZATION AND EXTRACTION OF NITROGENOUS CONSTITUENTS AND THE COLOR COMPARISON OF PROTEIN SOLUTIONS
Burnett, R. S.; and Fontaine, T. D.
Ind. Eng. Chem. 36: 284-88. (1944)

Industrial utilization of peanut meal and the separated protein depends on a knowledge of the properties of the nitrogenous and other constituents of peanut meal as a prerequisite to the development of methods of modifying these properties to meet the requirements for particular uses. In this article data are presented to

show that the nitrogen peptization values for peanut meals can be used as a practical guide in determining the amount of protein which can be separated from a meal. The relative spectral transmittances of peanut preparation in sodium hydroxide solution indicate that proteins of satisfactory color can be obtained from blanched, red-skinned peanuts and from unblanched, white-skinned peanuts. The practicability of using white-skinned varieties for industry uses is discussed.

51. ANTIOXYGENIC PROPERTIES OF MOLECULARLY DISTILLED FRACTIONS OF PEANUT OIL
Bailey, A. E.; Oliver, G. D.; Singleton, W. S.; and Fisher, G. S.
Oil and Soap 20(12): 251-55. (1943)

Through investigation of a refined peanut oil and the same oil hydrogenated to the degree to which hydrogenation is usually carried in the manufacture of commercial edible fat products, information was obtained on the extent to which the antioxidants of peanut oil can be separated by molecular distillation; on the stability of the oil at varying levels of antioxidant concentration; and the identity of the antioxidants.

42. EVALUATION OF THE MODIFIED RENARD AND KERR TESTS FOR THE DETERMINATION OF PEANUT OIL
Voorhies, S. T.; and Bauer, S. T.
Oil and Soap 20(9): 175-78. (1943) (Reprints not available)

In connection with cooperative work of the Fat Analysis Committee of the American Oil Chemists' Society, SRRL investigated the applicability of the Renard test, as modified by the Association of Official Agricultural Chemists, and the applicability of the Thomas and Yu modification of the magnesium-soap alcohol method of Kerr for the determination of peanut oil in admixtures with various other oils. The best results were obtained in analyses of mixtures of peanut-soybean oil, by the modified A. O. A. C. method, but neither method appeared to be sufficiently accurate to warrant its use for the quantitative determination of peanut oil in vegetable oil mixtures.

38. POSSIBILITIES OF PEANUT, PECAN AND SAFFLOWER-SEED OILS AS SUPPLEMENTS FOR OLIVE OIL
Bickford, W. G.; Mann, G. E.; and Markley, K. S.
Oil and Soap 20(5): 85-89. (1943)

As part of research to develop a suitable substitute for olive oil, especially for use in the textile industry, the chemical and physical characteristics of these oils were investigated and compared with those of olive oil to learn whether any of these oils simulated olive oil in composition. Although the composition of a commercial, completely refined peanut oil did not resemble that of a commercial brand of imported olive oil, the peanut oil appeared capable of modification to form a product chemically similar to olive oil, and for certain purposes it could replace olive oil without modification.

31. VARIABLES AFFECTING THE YIELD OF NORMAL OLEIC ACID PRODUCED BY THE CATALYTIC HYDROGENATION OF COTTONSEED AND PEANUT OILS
Bailey, A. E.; Feuge, R. O.; and Smith, B. A.
Oil and Soap 19(10): 169-76. (1942)

Peanut oil is one of a large group of industrially important fats and oils that contain glycerides of oleic and linoleic acids and only negligible quantities of other unsaturated acids. To establish the conditions to be used in research for the laboratory hydrogenation of cottonseed and peanut oils to obtain the greatest yield of normal oleic acid and the least loss of potential oleic acid, these variables were investigated: temperature, concentration of catalyst, hydrogen pressure, and degree of agitation and nature of the nickel catalyst. Increasing the temperature, increasing the catalyst, decreasing the pressure, and decreasing the agitation of the catalyst favored the formation of iso-oleic acid, simultaneously repressing the formation of stearic acid. The nature of the nickel catalyst may affect the composition of the hydrogenated oil. Peanut oil is a more suitable raw material than cottonseed oil for the production of normal oleic acid because of its initially greater content of this acid and its lesser content of linoleic acid.

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